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THE DETECTION OF FAULTY SIZING IN HIGH-GRADE PAPERS.

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The materials first used for sizing paper were flour, starches, and gums. Toward the end of the fourteenth century these were gradually displaced by the introduction of animal size, which has remained to the present time the standard sizing material for writing papers. The value of rosin size, which was first used at the beginning of the nineteenth century, has not equaled that of animal size for papers of this kind. This is true also of all other sizings since invented, since whatever they may have in common they do not impart to the paper the characteristic effects of animal sizings.

A certain degree of flexibility is imparted to the paper by animal size, which not only adds to the strength of the sheet, but aids materially in its durability. Rosin and other sizings produce a stiffness which tends to brittleness and impairs the folding endurance, so essential for resistance to severe handling and long service. The writing and erasure qualities of animal-sized papers are generally markedly superior to those of papers sized with rosin or other sizings, and the resistance of these papers to deterioration from light, fumes, heat, and moisture is greater, due, in part at least, to the fact that rosin and other sizings become discolored and are more susceptible to chemical interaction. Furthermore, there are certain qualities, as feel, look-through, finish, and rattle, which make a well-made animal-sized sheet distinctive and which all other sizings have failed to produce, except, possibly, when other valued characteristics are sacrificed.

Although animal sizing, when properly done with good materials, is superior to other sizings, it does not follow that all animal-sized papers are better than those sized with other materials. The proper sizing of paper requires as much care and regulation as the other

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operations which are so closely controlled in the manufacture of high-grade paper. For superior quality it is necessary to use superior materials. Poor stock may be improved by subsequent treatment, yet the final product can never equal that made from the best stock similarly handled. Therefore, in sizing for results which can not be excelled, it is imperative that the raw materials be of the best quality, and that all the operations of sizing and drying be controlled with knowledge and skill.

The sizing of paper is sensitive to many factors, the neglect of any one of which may seriously affect the characteristic qualities sought. Care must be given to the preparation of the size, the time and degree of extraction of the hide, the temperatures employed, the nature of the water used, the cooling down, and the storage of the size to avoid contamination by destructive bacteria, which may liquefy the glue and injure its elastic covering and setting qualities. The thoroughness with which the web of the paper is sized is dependent upon the consistency of the size, the degree of penetration before drying, the temperature of the drying, and also upon the tension under which the web is dried. All soluble salts or acid which unwashed stock may contain, and even loading materials, exert their disturbing influences and prevent the thoroughness necessary for the best and most lasting results.

Several procedures devised for the purpose of determining how well paper has been sized enable one to determine approximately whether or not a paper is ink resistant, but none are sufficiently delicate to permit close comparisons of well-sized papers. Methods based on the application to the opposite sides of the paper of solutions, which give a color indication as they penetrate the surfaces, are open to serious objections. Error will be introduced by applying the same amount of solution to papers of different weights, as in the case of heavy paper the rate of penetration decreases more rapidly as the supply of solution on the surface diminishes through absorption and evaporation. Humidity of the atmosphere not only affects this evaporation but also the rate of absorption of the solution by the paper, depending on the amount of moisture which the paper contains. In many instances there are chemical reactions and a nonuniformity in the application of the solutions which may destroy the size. Those procedures in which the irregularities of the spread of ink or its appearance through the paper are interpreted also are seriously influenced by humidity, formation of the sheet, selective absorption, and the personal factor which enters into the interpretation of the results observed.

That any of the present tests will detect poor size, upon which ink spreads, is unquestionable, but that they will detect superiority of sizing, where the writing quality has shown no distinction, is doubtful. Nearly all writing papers have good writing qualities, whether they be sized with rosin or with the best grades of animal size, by careless or the most painstaking methods of sizing and drying. Current methods are therefore unfit to distinguish differences in the quality of sizing materials or in the character of processes.

The test herein described was devised to differentiate between the relative values of the sizings of papers which the current methods failed to detect. It was devised to determine whether there is superiority of sizing in papers dried in any particular way. The method shows marked differences in sizings, all of which are resistant to ink. It has been found, for instance, from the examination of hundreds of samples of papers representing all grades and weights that the sizing of many loft-dried papers is very inferior and is equaled by many machine-dried papers.

The test consists in drawing a strip of paper over the surface of an iron tannate ink and allowing it to drain and dry naturally. Upon examining this inked surface with a magnifying glass it will be found that a well-sized paper will show no indication of the fiber having absorbed the ink, and the entire surface will be uniformly and lightly colored, as indicated in Plate I. In more poorly sized papers blotches of fibers absorb the ink, as shown in Plate II and Plate III, figure 1. Plate III, figure 2, shows water-leaf filter paper, indicating by the darker colors that the fibers have absorbed the ink. It should be remembered that all the papers shown in Plate I to Plate III, figure 1, inclusive, are, according to the ordinary methods of testing, well sized and practically identical.

Sizings may be further differentiated by rubbing the surface of a paper with an ink eraser, brushing off the loose particles, and proceeding as directed. A paper which is well sized through will still be uniformly colored and the fibers will take the ink but little.

The test is valuable in showing the faults of mill practice, especially as to whether in the sizing of high-grade papers the best results obtainable are being procured. By its use the paper maker can keep his product up to a desired high standard and the purchaser can assure himself that where the character of sizing is an important property poorly sized papers are not accepted.

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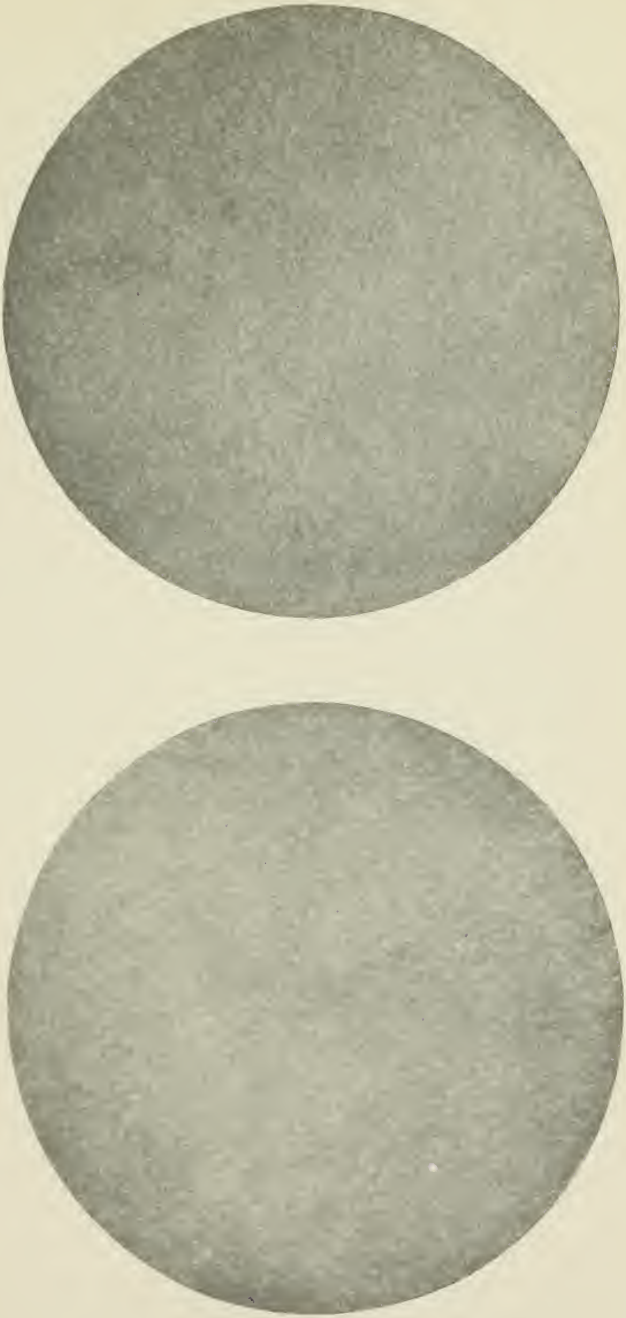
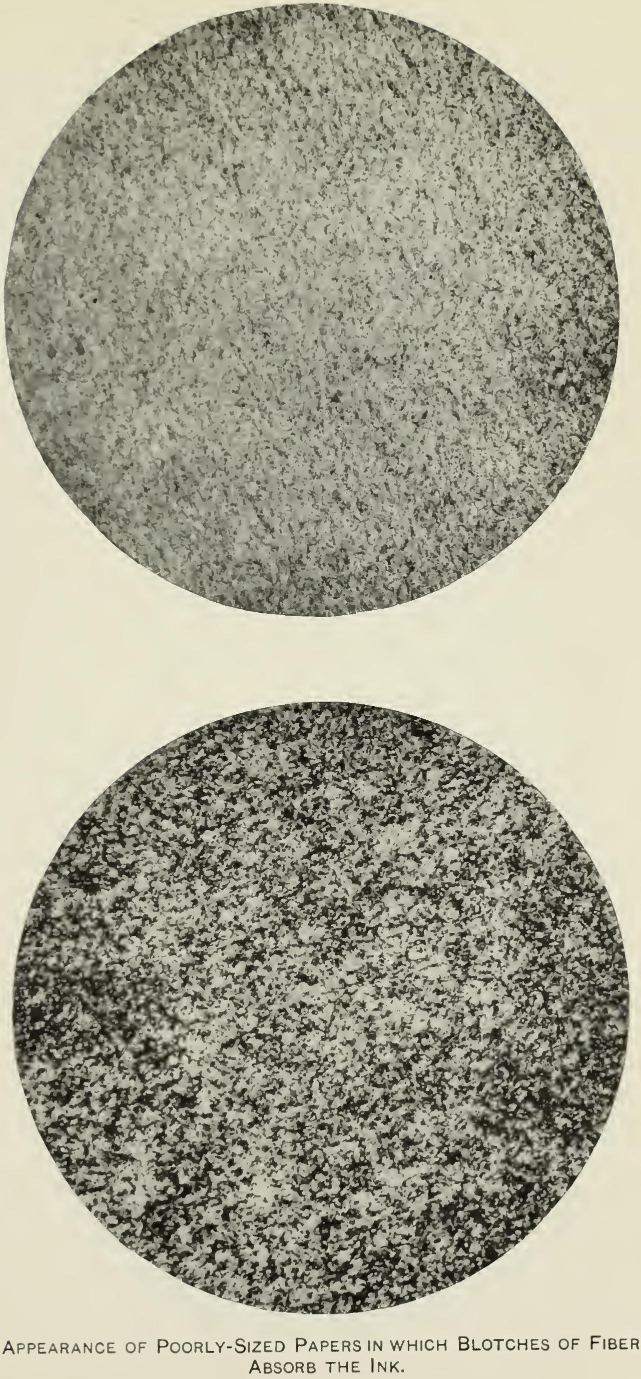


APPEARANCE OF WELL-SIZED PAPER AFTER TEST WITH IRON TANNATE INK.



APPEARANCE OF POORLY-SIZED PAPERS IN WHICH BLOTCHES OF FIBERS ABSORB THE INK.

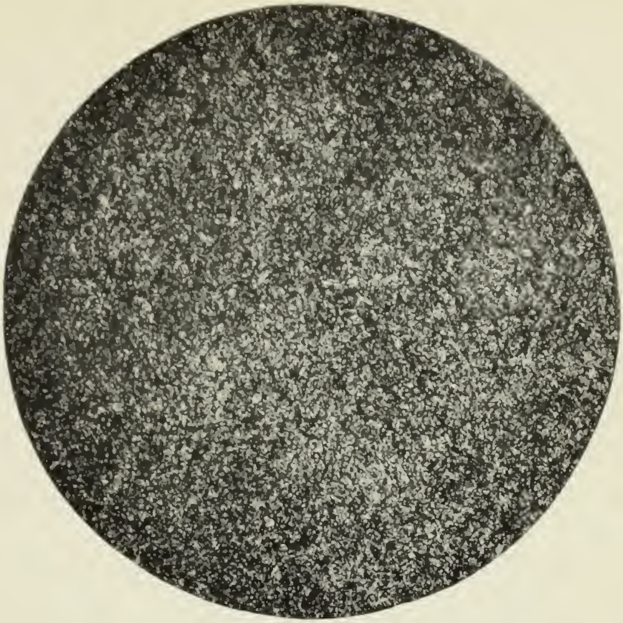


FIG. 1.—APPEARANCE OF PAPER WITH INFERIOR SIZING.

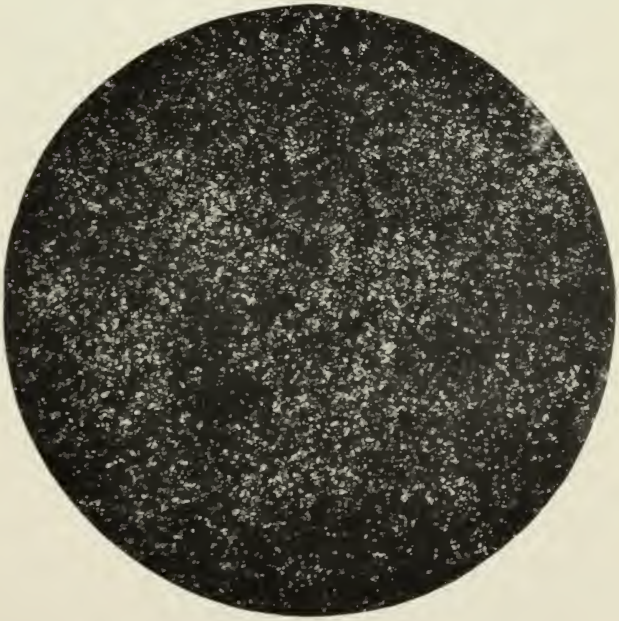


FIG. 2.—WATER-LEAF FILTER PAPER, SHOWING INK ABSORBED.